CENTRAL VALLEY REGIONAL
WATER QUALITY CONTROL BOARD

San Joaquin River Basin Rotational Sub-basin Monitoring: Eastside Basin, January 2003 – April 2004

(Stanislaus, Tuolumne, and Merced River Watersheds and Farmington and Valley Floor Drainage Areas)

Draft January 2010

CALIFORNIA ENVIRONMENTAL PROTECTION AGENCY

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REGIONAL WATER QUALITY CONTROL BOARD
CENTRAL VALLEY REGION

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1.0 EXECUTIVE SUMMARY

From January 2003 through March 2004, staff from the Central Valley Regional Water Quality Control Board (CVRWQCB) initiated the second rotation of the Intensive Basin Program (IBP) as part of the Surface Water Ambient Monitoring Program (SWAMP) for the San Joaquin River. The IBP was the final layer in the 3-tiered monitoring framework developed as part of the San Joaquin River Basin SWAMP. In the first two tiers, the main stem of the San Joaquin River (SJR) and the major inflows to the River were monitored monthly. During the IBP, sub-basins of the SJR were intensively monitored for one year on a rotational basis. The SJR watershed was divided into five sub-basins, based on similar management practices and hydrologies.

The purpose of each rotation was to identify current monitoring efforts within the sub-basin (agency and local) as well as any local water quality concerns, evaluate spatial and temporal trends of key constituents, and determine whether there was any evidence that beneficial uses were not being protected. Resulting information was utilized in the development of the Integrated Report which both assesses water quality in all surface waters and identifies beneficial use impairments (CVRWQCB 2009).

This second phase of the IBP focused on the watersheds draining the east side of the San Joaquin River Watershed, south of the Calaveras Watershed, and north of the Bear Creek Watershed. Specifically, this 6,091 square mile area, named the Eastside Basin covers approximately one third of the entire San Joaquin River Basin and includes the Stanislaus, Tuolumne, and Merced River Basins as well as the Farmington and Valley Floor Drainage Areas. The main source of water for the three major rivers is snowmelt from the Sierra Nevada, which travels through diverse geography with elevations ranging from 20 to 13,000 feet, as well as a variety of land uses (undisturbed, timber, grazing, urban and irrigated agriculture), and intense hydrologic management including regulating dams on the three major rivers.

Prior to initial water quality sampling, over 200 state, federal, and local agencies as well as known watershed groups were surveyed to identify current monitoring efforts and local concerns. Monitoring during the time of the study was limited to selected gauges maintained by the California Department of Water Resources and US Geological Survey, and targeted studies conducted by others. Data for the targeted studies was not readily accessible. Local concerns were focused on watershed characterization, flood control, agricultural and rural/urban development impacts. The final sampling design incorporated the initial survey findings including special studies upstream and downstream of subdivision construction in a rural foothill community (Sonora) and impacts of an agriculturally dominated watershed (Dry Creek) on the Tuolumne River.

Sampling within each basin was conducted twice a month for a 12-month period. Core constituents sampled consisted of: temperature, turbidity, dissolved oxygen, pH, specific conductance, total Coliform, and *E. coli*. As funding permitted, additional constituents were added: total suspended solids, total organic carbon, partial minerals, total trace elements, and water column toxicity. All information and water quality data for this project and other monitoring activities conducted under SWAMP in the San Joaquin River Basin are available within a year of sampling at the following web site:

http://www.waterboards.ca.gov/centralvalley/water_issues/water_quality_studies/surface_water_ambient_monitoring/index.shtml

The San Joaquin River Index is used to classify water year type from 1 October through 30 September of the following year, based on unimpaired runoff (SWRCB, 1995). Sampling in the Eastside Basin coincided with WYs 2003 and 2004, which were classified as below normal and dry, respectively.

During the study, constituents monitored displayed both spatial and temporal variations and some areas were identified for further review of potential impacts to beneficial uses.

Spatial Trend Findings:

Within the river basins, temperature, SC, turbidity, and *E. coli* concentrations were highly variable in the upper watersheds, while concentrations of all constituents except pH were the most stable at the reservoir releases. In the lower watersheds, concentrations of SC, turbidity, TOC, TSS and *E. coli* generally increased moving downstream. Tributary sites in both the upper watershed and lower watershed generally had higher temperature, median turbidity, TOC, and TSS than the main stem river sites.

Within the lower drainage areas, the Valley Floor area showed greater diversity in DO, SC, and pH concentrations than in the Farmington Area. The Valley Floor drains were overall higher in all parameters measured except temperature, pH, and DO, while the laterals generally had the highest concentrations of those parameters, matched by Farmington for DO. Additionally, TOC was higher in agriculturally dominated areas than in combined urban/agriculturally influenced areas.

Overall, discharges from all basins to the San Joaquin River had comparable temperature values and ranges. Concentrations and ranges for SC, turbidity, TOC, and *E. coli* were lowest at the three river inflows. For turbidity and *E. coli*, the Valley Floor laterals were similar to the river inflows, and for specific conductance, the Farmington site was similar to the river inflows. The Valley Floor Drains consistently had higher results and were more variable for SC, turbidity, TOC, and *E. coli*.

Temporal Trend Findings:

Seasonal trends in the river basins included increased temperature in the summer months, with an inverse trend in DO concentrations, except for the reservoir releases which were relatively constant year-round. Dips in SC corresponded to reservoir releases. Spikes in turbidity, TSS, TOC, and *E. coli* often occurred after rains and with irrigation flows. Similar to the River Basins, turbidity, TOC, TSS, and *E. coli* in the lower drainage areas increased after rainfall events, and in the case of turbidity and *E. coli,* after increased agricultural flows.

Stakeholder Concerns:

In evaluating the stakeholder concerns, significant increases of SC, turbidity, boron, calcium, chloride, sulfate, copper, cadmium, and zinc were found downstream of a residential construction site in a rural community. Also, significant increases of turbidity and *E. coli* were found downstream of the inflow to the Tuolumne River from an agriculturally dominated subwatershed.

Preliminary Assessment of Potential Beneficial Use Concerns:

Potential impacts to key beneficial uses were evaluated by using selected indicators and comparing results against published water quality goals, targets and/or guidelines as follows:

- Drinking Water (SC, minerals (chloride and sulfate), TOC, trace elements (arsenic cadmium, copper, mercury, nickel, lead and zinc) and E. coli);
- Aquatic Life (pH, temperature, DO, turbidity, water column toxicity, trace elements (arsenic, cadmium, copper, mercury, nickel, lead, and zinc), and hardness)
- Irrigation water supply (SC)
- Recreation (*E. coli*)

In summary:

Drinking Water – Elevated concentrations of arsenic were found at Littlejohn's Creek at Sonora Road and cadmium at Woods Creek at Mill Villa Drive. The high percent of elevated TOC concentrations above the Bay-Delta Program guideline for source water (43% of samples collected) makes TOC the highest potential drinking water concern, especially in the drainage areas and lower watershed tributaries. *E. coli* presence in most samples analyzed indicates possible presence of pathogens and a requirement of treatment prior to use for municipal supply.

Aquatic Life – Most areas of concern occurred in the Farmington and Valley Floor Drainage areas, especially for pH, DO, temperature, and trace elements. The majority of pH exceedances occurred during the late storm season (January – May) and was skewed to higher (more alkaline) concentrations. The DO at the MID Main Drain was below the objective (7.0 mg/l) throughout the study period. In addition, 34% of the samples analyzed did not meet the Bay-Delta Authority target for temperature (20-degrees C from 1 April to 30 June and/or 1 September to 30 December). Unlike drinking water where cadmium and arsenic were the only trace elements with elevated concentrations, zinc and copper were the only trace elements that had elevated concentrations when evaluated for aquatic life.

Irrigation – Concentrations above the 700 umhos/cm recommended by the Water Quality Goal for Agriculture were only found in the Valley Floor Drainage area from both drains and TID Laterals 6/7 and Lateral 7, representing 49% of the total elevated SC samples analyzed in the Valley Floor Drainage Area, but only 6% of the total elevated SC samples analyzed basin wide.

Recreation – The Basin Plan identifies a fecal coliform objective of 400 MPN/100-ml, which may have been exceeded at selected sites based on analysis of E. coli, a subset of fecal coliform. The elevated levels primarily occurred in tributaries passing through grazed land and in the drainage areas, with spikes in the tributaries corresponding to rainfall events and variable year-round spikes in the drainage areas. The *E. coli* results were also compared to USEPA contact recreation guidelines. All sub basins had concentrations above USEPA's Designated Beach guideline (235 MPN/100ml), except within the Stanislaus Watershed. When evaluated against USEPA's guidelines, approximately 70% of samples were acceptable for designated beaches, while 14% had limited use, and 16% were above all acceptable contact guidelines.

Future Activities

By the end of 2005, other Central Valley Water Board surface water monitoring efforts had expanded—notably the Irrigated Lands Regulatory Program (ILRP) and monitoring conducted under various grant efforts. The Central Valley Water Board SWAMP efforts became more focused on internal and external monitoring coordination rather than continuing to maintain a

separate monitoring strategy with shrinking resources. Some of these efforts related to the Eastside Basin include:

- Leveraging funds with a separate USEPA project to continue development of a web-based monitoring directory designed to display active monitoring within the entire Central Valley (http:centralvalleymonitoirng.org)
- Providing resources to insure ILRP water quality information is captured in the state-wide SWAMP master data base
- Developing a region-wide, long-term trend monitoring framework based on 30-sites within the Central Valley that are part of the state-wide SWAMP contaminant trend monitoring efforts (three Eastside Basin sites are included)

Efforts related specifically to the elevated *E. coli* concentrations found within the Eastside Basin as well as in other areas of the Central Valley as part of the ILRP monitoring follow:

- A Safe to Swim survey of *E. coli* concentrations in local swimming holes before, during, and after a holiday weekend (coordinated with Central Valley watershed groups during both 2007 and 2008, with a follow study in 2009.
- A pilot bacteria source identification project with the University of California, Davis, in selected streams that had demonstrated elevated *E. coli* concentrations.
- Continued, seasonal *E. coli* monitoring at 30 major integrator sites throughout the Central Valley.

Based on information collected during this project, future monitoring efforts in the Eastside Basin should consider:

- Increased coordination
  - Coordinated monitoring with the Irrigated Lands Program and stakeholder groups.
  - Tie monitoring in with priorities of other efforts to include the California Watershed Council and the San Joaquin River Restoration Program
  - Mapping all NPDES, irrigated lands, and other monitoring efforts.

- Expanded studies
  - Temperature surveys in the lower watershed areas during spawning and migration periods.
  - Expanded surveys for TOC, DO, SC, arsenic, and cadmium, especially in the Farmington and Valley Floor Drainage Areas, to include examining the impact of high concentration of these constituents in these waterways plays on the San Joaquin River and Delta.
  - Focused seasonal and source bacteria studies, particularly at areas known to be utilized for full contact recreation (e.g. local swimming holes).

Recommendations for future monitoring for each sub-basin include those parameters identified in Table 22 within the discussion and conclusion section of this report.